

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. APP. NO. 09/386,965

This listing of claims will replace all prior versions, and listing, of claims in the application:

AMENDMENTS TO THE CLAIMS:

1. (currently amended): A method for determining the rate of received data in a variable-rate communications system, the method comprising the steps of:

(a) pre-decoding data received at variable data rates and detecting quality information of the pre-decoded data received at the respective data rates; and

(b) estimating the rate of the received data based on the quality information of the pre-decoded data at the respective data rates, wherein the pre-decoding step is performed without using Viterbi decoding.

2. (previously presented): The method of claim 1, wherein the pre-decoding in step (a) is performed using an inverse function of a generating function used for encoding.

3. (original): The method of claim 1, wherein the quality information is a symbol error rate.

4. (previously presented): The method of claim 1, further comprising the step of:

(c) Viterbi decoding only the data corresponding to the estimated data rate.

5. (currently amended): A method for determining the rate of data received by a receiver in a variable-rate communications system, the method comprising the steps of:

(a) pre-decoding the received data at a first data rate and re-encoding the result, to output a first quality indication;

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(b) comparing the received data with the first quality indication, and counting the number of errors resulting from the comparison, to output an error metric for the first data rate;

(c) pre-decoding the received data at a second data rate and re-encoding the result, to output a second quality indication;

(d) comparing the received data with the second quality indication, and counting the number of errors resulting from the comparison, to output an error metric for the second data rate; and

(e) estimating the rate of the received data using the error metrics determined for the first and second data rates;

wherein the pre-decoding steps are performed without using Viterbi decoding.

6. (previously presented): The method of claim 5, further comprising the step of:

(f) selecting the estimated data rate from step (e) and Viterbi decoding only the selected data.

7. (previously presented): The method of claim 5, wherein the pre-decoding in steps (a) and (c) is performed using an inverse function of a generating function for encoding.

8. (previously presented): The method of claim 5, further comprising the steps of:

(f) pre-decoding the received data at a third data rate and re-encoding the result, to output a third quality indication; and


(g) comparing the received data with the third quality indication, and counting the

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number of errors resulting from the comparison, to output an error metric for the third data rate, wherein the error metric for the third data rate is also compared in the estimation of the data rate in the step (e).

9. (previously presented): The method of claim 8, further comprising the steps of:

(h) pre-decoding the received data at a fourth data rate and re-encoding the result, to output a fourth quality indication; and

 (g) comparing the received data with the fourth quality indication, and counting the number of errors resulting from the comparison, to output an error metric for the fourth data rate, wherein the error metric for the fourth data rate is also compared in the estimation of the data rate in the step (e).

10. (currently amended): An apparatus for determining the rate of received data in a variable rate communications system, the apparatus comprising:

a first means for pre-decoding data received at variable data rates, without using Viterbi decoding, and providing quality information concerning the pre-decoded data received at the respective data rates; and

a second means for estimating the rate of the received data, based on the quality information of the pre-decoded data received at the respective data rates.

11. (original): The apparatus of claim 10, wherein the quality information is a symbol error rate.

12. (previously presented): The apparatus of claim 10, further comprising a

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Viterbi decoder for Viterbi decoding only the data corresponding to the estimated data rate.

13. (currently amended): An apparatus for determining the rate of data received by a receiver in a variable-rate communications system, the apparatus comprising:

a first pre-decoder for pre-decoding, without using Viterbi decoding, received data having a first data rate;

a first encoder for re-encoding an output from said first pre-decoder;

a first comparator for comparing the data having the first data rate with an output from said first encoder;

 a first counter for counting the number of errors resulting from the comparison of said first comparator;

a second pre-decoder for pre-decoding received data having a second data rate;

a second encoder for re-encoding an output from said second pre-decoder;

a second comparator for comparing the data having the second data rate with an output from said second encoder;

a second counter for counting the number of errors resulting from the comparison of said second comparator; and

a decision unit for deciding which of the data received from said first and second counters has the least symbol error rate.

14. (previously presented): The apparatus of claim 13, further comprising a first pre-processing unit preceding said second pre-decoder.

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15. (previously presented): The apparatus of claim 14, wherein said first pre-processing unit is implemented with a summer, a combiner or a selector.

16. (previously presented): The apparatus of claim 13, further comprising:
a third pre-decoder for pre-decoding data having a third data rate;
a third encoder for re-encoding an output from said third pre-decoder;
a third comparator for comparing the data having the third data rate with an
output from said third encoder; and
a third counter for counting the number of errors resulting from the comparison of said
third comparator;
wherein an output from said third counter is inputted to said decision unit.

17. (previously presented): The apparatus of claim 16, further comprising a first pre-processing unit preceding said second pre-decoder.

18. (previously presented): The apparatus of claim 17, further comprising a second preprocessing unit preceding said third pre-decoder.

19. (previously presented): The apparatus of claim 18, wherein said first and second preprocessing units are implemented with a summer, a combiner or a selector.

20. (previously presented): The apparatus of claim 16, further comprising:
a fourth pre-decoder for pre-decoding data having a fourth data rate;
a fourth encoder for re-encoding an output from said fourth pre-decoder;
a fourth comparator for comparing the data having the fourth data rate with an
output from the fourth encoder; and

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a fourth counter for counting the number of errors resulting from the comparison of said fourth comparator;

wherein an output from said fourth counter is inputted to said decision unit.

21. (previously presented): The apparatus of claim 20, wherein said first through fourth pre-decoders use an inverse function of a generating function used for encoding.

22. (previously presented): The apparatus of claim 20, further comprising a first pre-processing unit preceding said second pre-decoder.

23. (previously presented): The apparatus of claim 22, further comprising a second preprocessing unit preceding said third pre-decoder.

24. (previously presented): The apparatus of claim 23, further comprising a third pre-processing unit preceding said fourth pre-decoder.

25. (previously presented): The apparatus of claim 24, wherein the first, second and third preprocessing units are implemented with a summer, a combiner or a selector.

26. (previously presented): The apparatus of claim 24, further comprising: a selector for selecting a full data rate or one of the outputs from said first, second and third pre-processing units according to an output from said decision unit; and a Viterbi decoder for Viterbi decoding only the output selected by the selector.

27. (currently amended): A variable-rate communications system capable of determining a data reception rate, comprising:


a first pre-decoder which receives data at a first data rate and pre-decodes the data, without using Viterbi decoding;

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a first encoder which receives an output from said first pre-decoder and re-encodes the pre-decoded data;

a first comparator which receives and compares the re-encoded data from said first encoder and the data having the first data rate;

a first counter which receives an output from said first comparator and counts the number of errors resulting from the comparison;

 a second pre-decoder which receives data at a second data rate and pre-decodes the data; a second encoder which receives an output from said second pre-decoder and re-encodes the pre-decoded data;

a second comparator which receives and compares the re-encoded data from said second encoder and the data having the second data rate;

a second counter which receives an output from said second comparator and counts the number of errors resulting from the comparison; and

a decision unit which receives an output from said first and second counters and decides which data rate has the least symbol error rate.

28. (previously presented): The apparatus of claim 27, further comprising a first pre-processing unit preceding said second pre-decoder.

29. (previously presented): The apparatus of claim 28, wherein said first pre-processing unit is implemented with a summer, a combiner or a selector.

30. (previously presented): The apparatus of claim 27, further comprising:
a third pre-decoder which receives data at a third data rate and pre-decodes the data;

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a third encoder which receives an output from said third pre-decoder and re-encodes the pre-decoded data;

a third comparator which receives and compares the re-encoded data from said third encoder and the data having the third data rate; and

a third counter which receives an input from said third comparator and counts the number of errors resulting from the comparison;

wherein an output from said third counter is inputted to said decision unit.

31. (previously presented): The apparatus of claim 30, further comprising a first pre-processing unit preceding said second pre-decoder.

32. (previously presented): The apparatus of claim 31, further comprising a second pre-processing unit preceding said third pre-decoder.

33. (previously presented): The apparatus of claim 32, wherein said first and second pre-processing units are implemented with a summer, a combiner or a selector.

34. (previously presented): The apparatus of claim 30, further comprising:
a fourth pre-decoder which receives data at a fourth data rate and pre-decodes the data; a fourth encoder which receives an output from said fourth pre-decoder and re-encodes the pre-decoded data;

a fourth comparator which receives and compares the re-encoded data from said fourth encoder and the data having the fourth data rate; and

a fourth counter which receives an output from said fourth comparator and counts the number of errors resulting from the comparison;

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wherein an output from said fourth counter is inputted to said decision unit.

35. (previously presented): The apparatus of claim 34, wherein said first through fourth pre-decoders use an inverse function of a generating function used for encoding.

36. (previously presented): The apparatus of claim 34, further comprising a first pre-processing unit preceding said second pre-decoder.

37. (previously presented): The apparatus of claim 36, further comprising a second pre-processing unit preceding said third pre-decoder.

38. (previously presented): The apparatus of claim 37, further comprising a third pre-processing unit preceding said fourth pre-decoder.

39. (previously presented): The apparatus of claim 38, wherein the first, second and third pre-processing units are implemented with a summer, a combiner or a selector.

40. (previously presented): The apparatus of claim 38, further comprising:
a selector which receives inputs from said first, second and third pre-processing units and an input having a full data rate and selects one according to an output from said decision unit; and
a Viterbi decoder which receives and Viterbi decodes only said selected output from said selector.-
